

5V/1A Synchronous Boost with 1A Linear Charger for Power Bank

DESCRIPTION

The ETA9640 is a fully integrated power management unit specifically designed for Power Bank, Mobile Charger, Backup Battery Charger applications. It consists of a high efficiency synchronous step-up boost converter and a linear battery charger. The boost can provide up to 1A output current at 5V of from a Li-Ion battery input voltage, while the charger can charge up to 1A of current from an AC adapter input. The boost incorporates circuits that disconnect the input from output, during shutdown, short-circuit, output current overloading, or other events when output is higher than the input. This not only eliminates the need for an external MOSFET and its control circuitry to disconnect the input from output, also provides robust output overload protection. Using a patent pending technique to drive the charger LED indicator, it eliminates the need for a micro-controller normally needed in mobile chargers. While saving the cost of a micro-controller, since the whole units only consumes less than 100uA of quiescent current during no load, when considering standby time for one charge, it is a much superior solution comparing to the traditional solution that needs a micro-controller which normally consumes up to 1mA current. ETA9640 is available in ESOP8 package.

FEATURES

- ◆ 2in 1: A Synchronous boost plus A Charger
- ◆ Short-circuit Protection
- ◆ 5W Output Power for the Boost
- ◆ Boost Output to Input Reversed Current Protection
- ◆ Up to 1A Charging
- ◆ Up to 96% Efficiency during Boosting
- ◆ 100µA No load Iq
- ◆ Programmable Charging Current

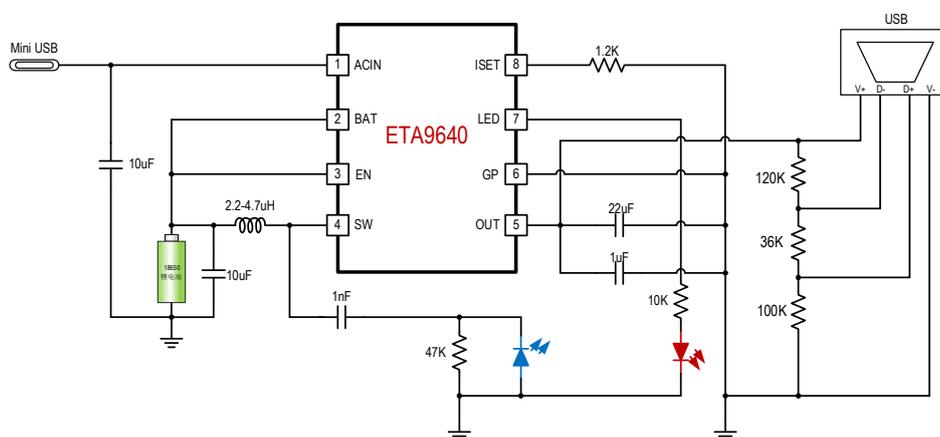
APPLICATIONS

- ◆ Portable Power Bank
- ◆ Portable 3G/4G WiFi Hotspot
- ◆ Tablet PC
- ◆ Portable Device power with Li-ion battery and USB output

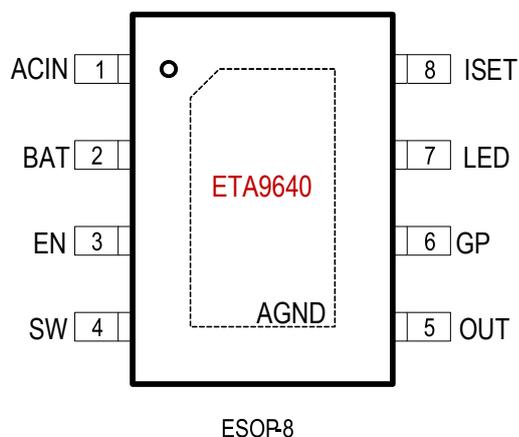
ORDERING INFORMATION

PART	PACKAGE PIN	TOP MARK
ETA9640E8A	ESOP-8	ETA9640 YWW2L (Date Code)

TYPICAL APPLICATION



PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

ACIN Voltage	-0.3V to 6.0V
OUT Voltage	-0.3V to 5.0V
All Other Pin Voltage.....	VIN-0.3V to VIN+0.3V
SW to ground current.....	Internally limited
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-55°C to 150°C
Thermal Resistance θ_{JA} θ_{JC}	
ESOP-8.....	50 10..... °C/W

ELECTRICAL CHARACTERISTICS

(V_{BAT} = 3.6V, V_{OUT} = 5V, unless otherwise specified. Typical values are at TA = 25°C.)

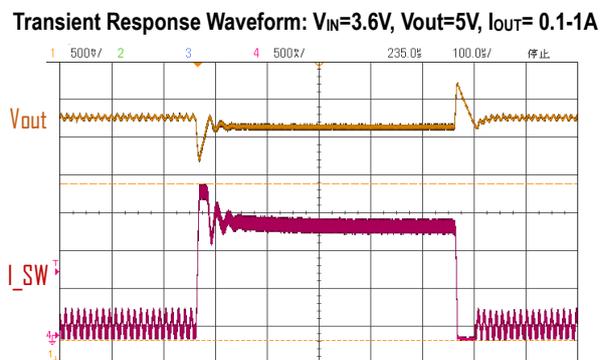
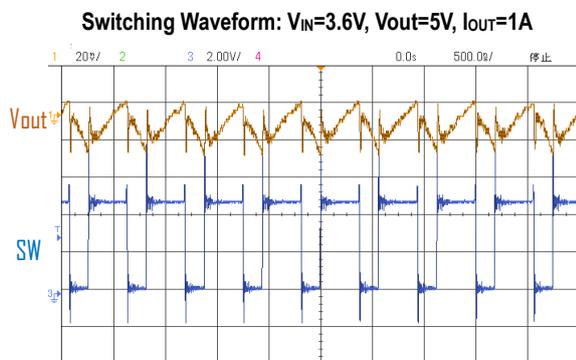
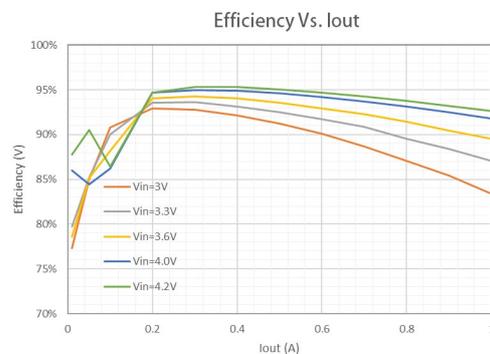
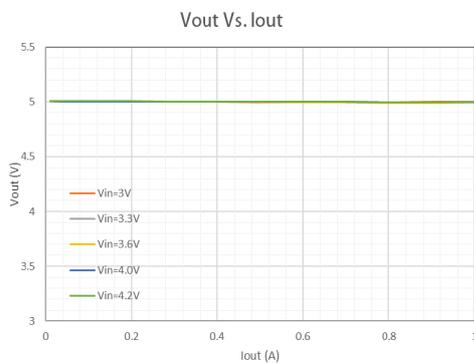
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output USB Voltage Range		4.9	5.05	5.2	V
Quiescent Current from battery	V _{BAT} =3.6V, No load		100		µA
Shutdown Supply Current from battery	V _{EN} =GND		6	10	µA
BAT UVLO at Rising			3.07	3.25	V
BAT UVLO at Falling		2.45	2.6	2.75	V
Switching Frequency		1.4	1.8	2.2	MHz
Low Side Main FET R _{DS(on)}			180		mΩ
Synchronous FET R _{DS(on)}			120		mΩ
Maximum Duty Cycle		90			%
Switch Current Limit		1.6	1.85		A
EN Input Current	V _{EN} =3V	1	1.5	2.5	µA
Input miniUSB Voltage		4.5		6.0	V
Charge Termination Voltage		4.15	4.2	4.24	V
Recharge Threshold			4.05		V
Trickle Charge Voltage threshold		2.65	2.87	3.1	V
Charging Current	=1000/R1, when R1=1K	0.85	1	1.15	A
Trickle Charge Current		50	80	110	mA
Termination Charge Current Threshold	=I _{term} /I _{charge_set}		0.1		A
LED Sink Current			5		mA
Thermal Shutdown	Rising, Hysteresis=20°C		150		°C

PIN DESCRIPTION

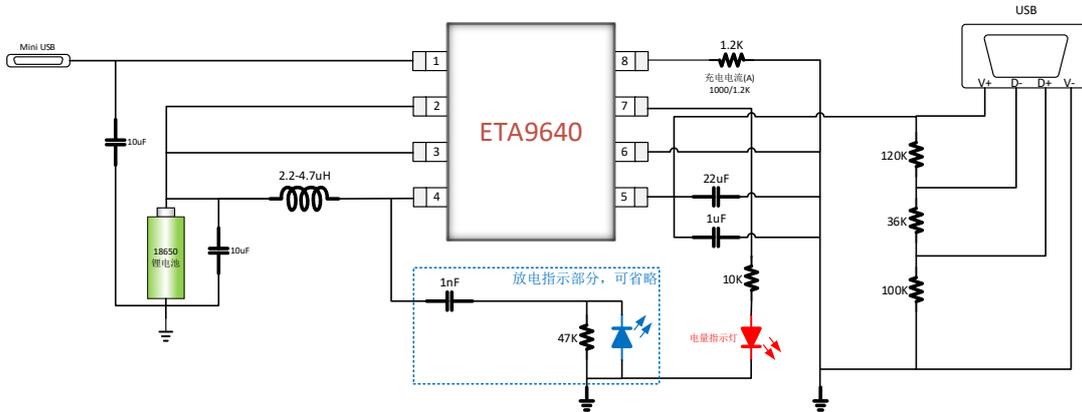
PIN #	NAME	DESCRIPTION
1	ACIN	Charger input pin. Connect to an AC adaptor or a USB charger output.
2	BAT	Battery input pin. Bypass BAT to GND with a 10uF or greater ceramic capacitor.
3	EN	Enable pin for the IC. Drive this pin high to enable the IC, low or floating to disable.
4	SW	Switching node of the Switching Regulator. Connect a 1uH to 4.7uH inductor between SW pin and the positive terminal of the battery.
5	OUT	Output pin. Bypass with a 22uF or larger ceramic capacitor closely between this pin and ground.
6	GP	Power ground.
7	LED	Battery quantity display or Torch lighting.
8	ISET	Charge Current set pin for AC input. Connecting a Resistor (Rset) between ISET to GND. This sets the fast charge current value as $I_{charge} = 1000/R_{set}$ (A)
Exposed PAD	GA	Analog ground.

TYPICAL CHARACTERISTICS

(Typical values are at $T_A = 25^\circ\text{C}$ unless otherwise specified.)



APPLICATION NOTES



The ETA9640 is designed dedicated for a Li-ion powered system with 1A USB output port, such as portable power bank. A complete application circuit is shown above, where one can find very few peripheral devices needed. The 120K/36K/120K serial resistor is just for the iPhone charging port setup, which is not necessary for all systems. One can also simply short the D+ and D- pin of the USB output port to achieve the same function.

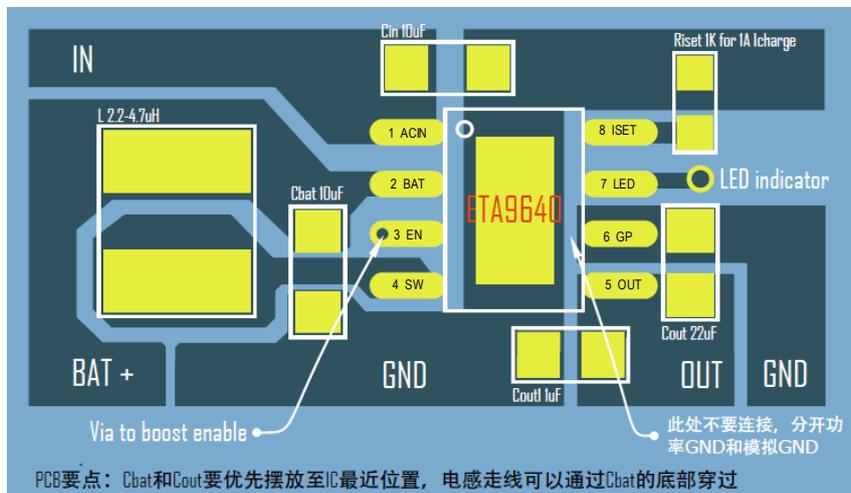
The blue LED with 1nF capacitor and 47K resistor filter is for an output indicator, which can also be removed if one don't need this indicator. The red LED is to indicate the battery voltage level, which serves as an 4-level battery “gas gauge”.

Customer service

Please contact your dealer or directly e-mail customer service of ETA Solutions for detail information of ETA9640.

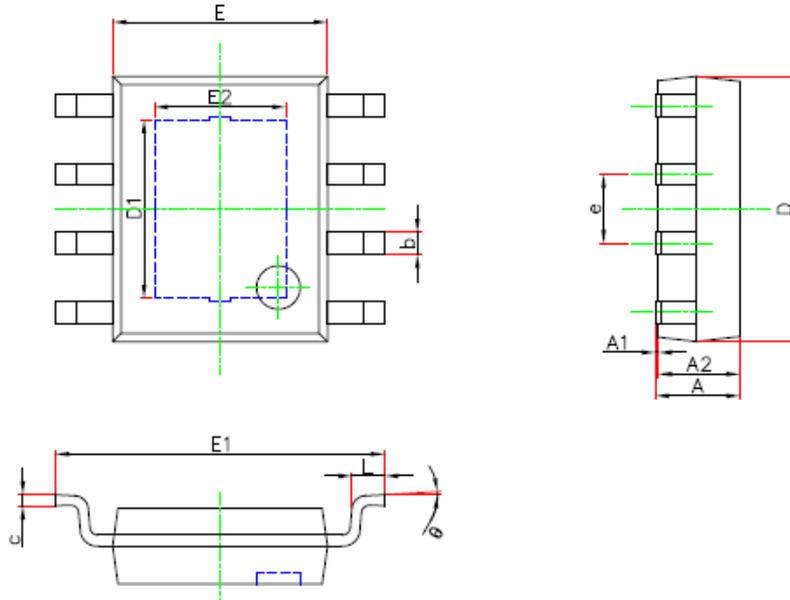
PCB LAYOUT GUIDELINE

A recommended PCB layout is shown below. The capacitors, Cbat and Cout must be placed as close the ETA9640 as possible.



PACKAGE OUTLINE

Package: ESOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.300	1.700	0.051	0.067
A1	0.000	0.100	0.000	0.004
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°